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HAWAII AGRICULTURAL EXPERIMENT STATION
HONOLULU, HAWAII

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THE MANAGEMENT OF BABY CHICKS IN CONFINEMENT

BY

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THE MANAGEMENT OF BABY CHICKS IN CONFINEMENT

By C. M. Bice, *Poultry Husbandman*

INTRODUCTION

The success of a poultryman is partly measured by his ability to raise baby chicks to maturity. A high mortality in chicks increases the cost of each pullet placed in the laying house, and naturally decreases the profits for the year. Replacement of a part of the flock with pullets is necessary each year. This replacement is dependent upon the success of the brooding operations, which is one of the most difficult problems awaiting solution in poultry management.

The high mortality of chicks in the poultry division of the University of Hawaii during the brooding seasons of 1924-1927 justified making a change in the methods of managing them. Severe losses were occasioned by coccidiosis, sorehead, roundworm and bacillary white diarrhea. After the cause of the first three troubles was discovered, a successful method of raising chicks in confinement was devised.

The pullets were confined throughout their first year of production, and as breeders were given free range in their second year. Results of a previous experiment at the station showed that the percentage of fertility and hatchability is increased by giving the hens free range.

Brooder Houses and Runs

The brooder houses in use at the station are 8 feet wide and 12 feet long, and have a capacity for 250 chicks. They are of the shed roof type and built entirely of wood. The front of one type of house is partly open for proper ventilation, but may be closed by lowering the tarred paper curtain running from a sheeting board attached to the top of the house (Figure 1). The front of

the other type of house is entirely open and protected against rain and wind by a roof above the run (Figure 2). Further ventilation may be had by placing openings in the rear and the sides of the house. A window of some glass substitute is built in the side openings (Figure 1) so that the direct ultra-violet rays of the sun may reach the chicks. This is a very desirable feature inasmuch as direct sunshine prevents rickets in chicks that are closely confined.

The house is made mosquito-proof as a preventive measure in the control of sorehead. Results of experiments at the station and at the Rockefeller Institute for Medical Research seem to indicate that sorehead may be spread by the mosquito.

It has been found advisable to build the houses 2½ feet above ground in order to keep the floor dry, and to protect the chicks against the invasion of rats (Figure 1). The circulation of air under the house prevents the floor from absorbing moisture from the ground and keeps the place dry—a very essential factor in the successful rearing of chicks.

Brooder runs, built 2½ feet above the ground, increase the capacity of the houses and reduce the possibility of crowding. Two types of runs are used to advantage at the station. One type has a floor of half-inch mesh hardware wire placed on removable

Figure 1—Brooder house and run, with glass substitute windows.

Figure 2—Brooder house with covered runs.

frames; the other has a concrete floor and a roof covered with roofing paper. The run, in each case, is made mosquito-proof to protect the chicks from attack by the day mosquito. The runs are 12 feet wide, 20 feet long, and 3 feet to 7 feet high.

Brooding Equipment

Good brooding equipment more than pays for itself in the time and the labor saved in its use. Pullets and cockerels can be properly developed only when the brooding equipment is such that food, water, and heat are readily available for them. Diseases can often be prevented by the use of equipment providing for rigid sanitation. Equipment that can be easily cleaned and sprayed aids in reducing mortality by lowering the possibilities of infectious diseases in the flock.

Electric brooders, 42 inches in diameter, are used at the station to hover 250 chicks. A metal guard, 12 inches high, is placed around the brooder to shut out floor drafts, conserve heat, and keep the chicks as near the source of heat as possible.

The feed troughs are of simple construction and adapted to the size of the chicks. Enough hoppers are so spaced for the first two

weeks as to enable every chick to feed at the same time. After the second week and up to the twelfth week, four hoppers, each 4 feet long and 4 inches wide (inside measurement), are allotted to every one hundred birds. A large hopper, 6 feet long and 14 inches wide, is used in the laying house for every one hundred birds.

Two-quart porcelain fountains are used for feeding the chicks with semi-solid buttermilk. The fountains are set on metal pans which are covered with half-inch mesh hardware wire (Figure 3). These pans catch the milk that is dropped by the chicks, and thus help to keep the litter on the floor dry. In order that the chicks may not wet themselves in the fountains, a piece of wire is placed around the fountain and the chicks drink through the spiral openings.

Concrete and wooden troughs are used for supplying water. No water is fed until the sixth week, consequently small troughs or fountains are not used. The water troughs for chicks after the sixth week and up to the twelfth week are so constructed as to provide fresh running water at all times. A faucet drips continuously and an over-flow pipe carries off the surplus to the ground outside the run.

The roosts are made of scantling 3 inches wide and ¾ inch thick, and are placed over false bottoms of ¾-inch mesh poultry netting to keep the chicks away from the droppings. The roosts are hinged twelve inches above the floor on the rear wall, with a 3-inch board in front, to make slanting roosting quarters. This board is replaced with a 12-inch board set on the level after the chicks have learned to roost.

Figure 3—A group of pullets, three weeks old, on runs of half-inch hardware wire.

BROODING MANAGEMENT

Temperatures

The brooding temperatures for electric brooders are for the first day—100° F.; for the second day—99° F.; for the third day—98° F.; for the seventh day—95° F.; for the fourteenth day—90° F.; for the twenty-first day—90° F. (hover 9 inches above the floor); and for the twenty-eighth day—85° F. (hover 12 inches above the floor).

After the fourth week the roosts are set in place, and by the fifth week the birds are roosting without heat, except on nights that are colder than usual when heat should be supplied.

Early Roosting

Vices and diseases of chickens can be more readily controlled when early roosting is practiced. Crowding the chicks beneath a brooder develops in them a tendency toward cannibalism, slow feather development, and disease. The litter is one of the sources of coccidiosis, a disease that kills hundreds of chicks in Hawaii. The encouragement of early roosting at the end of the fourth week keeps the chicks away from the floor and the litter, and thus reduces the possibility of infestation. Better ventilation can also be had on the roosts than on the floor, where the air is cold and foul.

Brooding Sanitation

Sanitation is the keynote of successful brooding. Many diseases that attack baby chicks can be prevented by cleanliness. At this station, a hot lye solution is used extensively in the sanitation program. The floors, sidewalls, and brooding equipment are washed

with the solution after they have been washed with water. The lye solution is made by dissolving a can of concentrated lye in six gallons of hot water. An old broom is used to apply the lye solution to the brooding equipment. After the house is treated with lye it is washed again with water and then sprayed with a coal tar disinfectant (Figure 4).

The litter beneath the brooder is changed every day for the first week, and the entire house is cleaned once a week thereafter. Finely chopped alfalfa hay is used for the first week and rice hulls for the remainder of the brooding period. The brooder house runs are washed and sprayed with a coal tar disinfectant at least once a week and occasionally twice a week (Figure 4).

A pan containing a disinfectant is placed near the entrance of each house. The attendant steps into this disinfectant before entering the house. Visitors are not permitted to enter the brooder houses in order that disease germs may not be brought in.

The drinking utensils are washed twice each day and disinfected once a week as a safeguard against the introduction of disease. Milk is fed only in porcelain fountains, and water is fed in porcelain, concrete, or galvanized iron fountains.

Figure 4—Spraying with a coal tar disinfectant.

Segregation of the Sexes

The cockerels are removed from the brooder house just as soon as they can be accurately distinguished from the pullets (Figure 5). The time of removal differs with the breed. Leghorns, Minorcas, and Anconas are segregated at four to six weeks of age. Rhode Island Reds, Plymouth Rocks, Australorps, Jersey Giants, and Brahmas, on the other hand, are separated at ten to twelve weeks of age. In certain cases the males cannot be accurately determined at four months, but they are removed from the brooder house as soon as they are found. Separating the cockerels from the pullets at an early date prevents crowding of the pullets and allows for a greater feeding space and for greater feed consumption. This treatment enables the pullets to grow more rapidly than would otherwise be the case. After the cockerels are removed the pullets have more roosting space, which is likewise conducive to growth.

Grading the Cockerels and the Pullets

Not only is it necessary to separate the males from the females but it is also necessary to separate birds of the same sex from one another to promote size and vigor. The pullets and the cockerels of the same size and vigor are housed separately (Figures 6 and 7). This procedure assures a more uniform development of all the pullets and cockerels, inasmuch as each group is cared for in accordance with its needs.

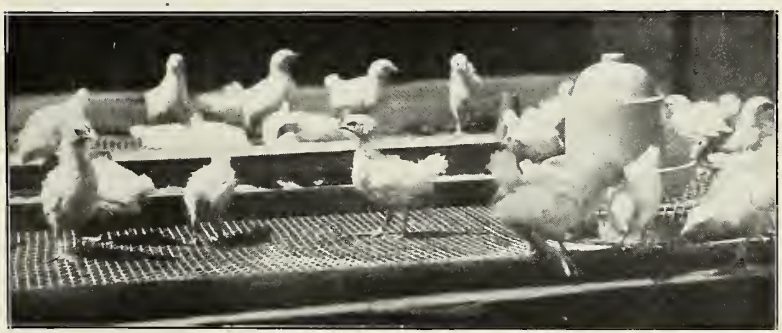

Figure 5—A group of cockerels. Segregated from the pullets at three weeks of age.

Figure 6—Confined pullets at nine weeks of age.

Broilers are disposed of as rapidly as they attain the desired market weight. Disposal of the broilers enables the cockerels that are reserved for use as breeders to have plenty of room and feeding facilities.

Feeding

As has been shown by experiments, it is desirable to feed the chicks when they are 24 to 36 hours old. Early feeding hastens early yolk absorption, lessens the tendency to over-feed, and eliminates vices.

Chick-size grit is placed on clean paper or in paper plates before the chicks. This is their first feed and a very essential one. Then semi-solid buttermilk is fed from porcelain fountains, a mixture of one part of semi-solid buttermilk being used to nine parts of water if no dried milk is in the mash, and one part of semi-solid buttermilk to twelve parts of water if dried milk is in the mash. Milk is the best food for chicks up to a certain age. Water may be used if dried milk in sufficient amount is in the mash. All milk and water is fed warm during the first week to encourage early yolk absorption and greater consumption.

After the chicks have had their first meal of grit and milk they are ready to receive mash feeds. Dry mash is placed on paper before the chicks for the first day at two-hour intervals. On the second day the mash is fed in small open hoppers and remains before the chicks all day. The chicks empty the hopper once during the day, thus assuring an appetite. After the chicks are four weeks old the mash hopper is kept filled at all times. One per cent of cod-liver oil is added to the dry mash for seven months.

Of the two methods of feeding now in use,—the "all mash"

method and the "mash and scratch" method—only the latter is used at the station for chicks in close confinement.

The scratch feed is fed for the first time on the tenth day and at the last feeding only. On the twentieth day the scratch feed is fed morning and night in amounts that are eaten in one hour. All of the feed, including green feed, is fed in hoppers only. Never feed in the litter. On the seventh day, and twice a day thereafter, green feed is fed in the form of chopped green alfalfa. Charcoal, oyster shell and grit, and bone are fed in open hoppers from the seventh day. When the chicks are ten to twelve weeks of age the semi-solid buttermilk is omitted from the ration so that the birds will not lay too early. At five and one-half to six months is early enough for Leghorns to begin to lay, and at six and one-half to seven months for the heavier breeds.

At twelve weeks of age the birds receive scratch feed three times a day in open hoppers. This practice encourages the consumption of more scratch feed and less mash, and discourages the consumption of too much protein with the result that sexual development is retarded and growth is stimulated. Mash for laying hens is not fed until the pullets have been in production for one month.

Commercial feeds are used exclusively at the station because the majority of poultry producers in the Territory use them. However, the system of feeding differs from that advocated by the manufacturer of the feeds.

Figure 7—Confined cockerels at nine weeks of age.

Diseases and Mortality

Of the 1864 chicks hatched in 1929, 179 or 9.6 per cent of them died. Of the 1184 chicks hatched in 1930, 65 or 5.5 per cent of them died. Close confinement reduces mortality because it permits close supervision of the chicks—a practice which emphasizes attention to details and prevents the occurrence of most diseases. Coccidiosis has appeared, but only in a mild form. Sorehead and bacillary white diarrhea have caused very little trouble.

Growth of Chicks

Most poultrymen desire information relating to the cost of producing baby chicks. To obtain this information it is necessary to know the rate of growth, the amount of feed consumed, and feed costs. Table I shows the average weight and gain of chicks, the feed consumed per chick, and the cost of feeding, up to thirteen weeks, per chick.

TABLE I.

The Weight, Gain, and Feed Consumption of Single Comb White Leghorn Chicks Reared in Close Confinement at the Hawaii Station

Age	Average weight per chick		Average gain per chick		Feed consumed per chick	
	1929	1930	1929	1930	1929	1930
Weeks	*Lbs.*	*Lbs.*	*Lbs.*	*Lbs.*	*Lbs.*	*Lbs.*
1	0.120	0.142	0.046	0.075	0.007	0.008
2	.152	.194	.032	.052	.161	.142
3	.232	.300	.080	.106	.227	.236
4	.301	.370	.069	.070	.299	.301
5	.383	.461	.082	.091	.359	.389
6	.485	.550	.102	.082	.406	.443
7	.527	.737	.042	.187	.429	.497
8	.762	.865	.235	.128	.546	.604
9	.955	1.010	.193	.145	.793	.806
10	1.076	1.224	.121	.214	.895	.932
11	1.230	1.489	.154	.265	1.016	1.146
12	1.430	1.632	.200	.143	1.219	1.246
13	1.610	1.800	.180	.168	1.111	1.471
Total			1.536	1.726	7.468	8.221

Table I shows that chicks do not make equal gains from week to week, nor do the gains increase with the age of the chick after the sixth week. The rate of growth is greatest when the chicks are young. It is, therefore, apparent that the cheapest gains are made during the early part of the life of a chick. This emphasizes the fact that chicks should be properly fed and cared for to safeguard them from diseases which retard growth. Enough feed should be given to enable the birds to make their best development. The amount of feed required up to thirteen weeks is very small, yet it is important that each chick receives its share of the feed available.

TABLE II.

Cost of Feeding a Single Comb White Leghorn Chick up to Thirteen Weeks at the Hawaii Station

	1929	1930
Mash, scratch, milk	$0.4651	$0.4087
Grit	.0033	.0028
Charcoal	.0017	.0012
Oyster Shell	.0023	.0021
Alfalfa	.0035	.0039
Cod-liver oil	.0036	.0033
Total Cost	$0.4795	$0.4220

Table II shows that the cost of feeding a Single Comb White Leghorn chick up to thirteen weeks was approximately 48 cents in 1929. Of this amount, the scratch feed, and the mash and milk cost 46½ cents. The minerals, green feed, and cod-liver oil comprise a very small part of the total feed cost. During the year 1930, the feed cost was 42 cents per chick up to thirteen weeks of age.

Transfer of Pullets to Laying House

At twelve weeks of age the pullets are transferred from the brooder houses to the mosquito-proof laying house. Precautions are taken to have birds of the same development together, and to limit the number of pullets in a pen. The pullets remain in this house until the following brooding season, when they are moved to the breeding pens to make room for the oncoming pullets (Figures 8 and 9).

Advantages of Rearing Baby Chicks in Confinement

Rearing baby chicks in confinement as observed at this station offers the following advantages:

(1) Rapid growth is secured due to the absence of parasitic infestation.

(2) Close supervision as to minor details is made possible.

(3) Only small land area is required to rear a large number of chicks.

(4) There are no losses from rats, mongoose, or stray cats and dogs.

(5) The most striking result is the low mortality.

(6) Because of the size of the chicks, the houses and runs can be economically and efficiently made mosquito-proof—a precautionary measure against chickenpox.

Figure 8—Pullets confined in laying house.

Figure 9—Seven months old pullets in production. Confined in laying house.

When Is This System Advisable?

The raising of chicks in confinement is practical and advisable for the poultryman whose land is heavily infested with intestinal parasites; for the poultryman who has had a high mortality from coccidiosis; for the poultryman whose land is low and damp; for the poultryman who keeps poultry as a side-line in the backyard; and lastly for the poultryman who has a small area of land (not large enough to allow free range for his birds) and who desires, despite this handicap, to raise a large number of healthy chicks each season.